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Spooner

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(54) **LASER APPARATUS AND METHOD FOR REFRACTIVE SURGERY**

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(52) **U.S. Cl.**

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(58) **Field of Classification Search**

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See application file for complete search history.

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(57) **ABSTRACT**

An ultrashort pulsed laser instrument is used to perform refractive surgery. The invention operates in ablative and incisional modalities. In the ablative mode, spiral ablation disks (10) consisting of individual laser pulses (40) are produced at high scanning speeds. Ablation profile (11) may be produced in cornea (22) by stacking and arranging multiple ablation disks (10) to produce a specified shape change. Placement of ablation disks (10) is assisted by an optical tracking and control system that compensates for eye motion. A preferred embodiment allows for ablative corrections to be performed on non-planar posterior surface (112) of a laser cut flap affixed to registration platen (120), thereby avoiding exposing the eye interior to high radiant power. Laser cut and contrast agent dyed fiduciary marks (30) may serve as reference features for the optical tracking system. Incisional procedures, such as corneal flaps for LASIK, may also be performed.

10 Claims, 10 Drawing Sheets

